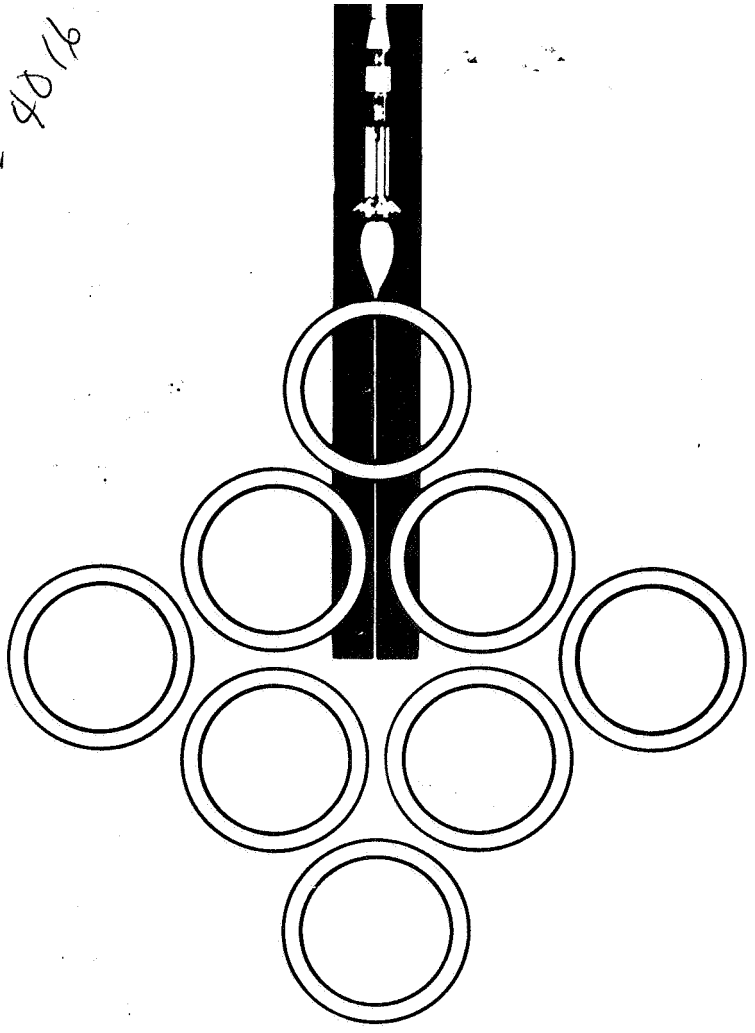

ENGINEERING DEPARTMENT

TECHNICAL REPORT

TR-RE-CCSD-FO-1123-3

June 27, 1967

SATURN IB PROGRAM

TEST REPORT
FOR

GLOBE VALVE, 1/2-INCH

Grove Valve and Regulator Company Part Number 11193A046B

NASA Drawing Number 10428576

SPACE DIVISION CHRYSLER CORPORATION

TR-RE-CCSD-FO-1123-3

Addendum I

TEST REPORT

FOR

GLOBE VALVE, 1/2-INCH

Grove Valve and Regulator Company Part Number 11193A046B

NASA Drawing Number 10428576

ABSTRACT

This report presents the results of functional, seat erosion, and burst tests performed on one specimen of the Globe Valve 10428576.

The valve was completely rebuilt by replacing all soft goods which were damaged during the original burst test (see Section X). A flow test, not required by TP-RE-CCSD-FO-1123-2F, was then performed to determine whether high velocity GN_2 flow causes degradation or deformation to the valve seat.

The specimen's performance was in accordance with the specification requirements of NASA drawing 19428576 except during burst testing.

During burst testing, the valve failed at 14,600 psig. The specification requirement is that the valve withstand a minimum burst pressure of 24,000 psig.

TEST REPORT

FOR

GLOBE VALVE, 1/2-INCH

Grove Valve and Regulator Company Part Number 11193A046B

NASA Drawing Number 10428576

ABSTRACT

This report presents the results of tests performed on one specimen of the Globe Valve 10428576. The following tests were performed:

1. Receiving Inspection
2. Proof Pressure
3. Functional
4. Flow
5. Surge
6. Low Temperature
7. High Temperature
8. Life Cycle
9. Burst

The specimen's performance was in accordance with the specification requirements of NASA drawing number 10428576 except during burst testing.

During burst testing, the valve failed at 15,000 psig. The specification requirements were that the valve withstand a minimum burst pressure of 24,000 psig.

TR-RE-CCSD-FO-1123-3

TEST REPORT

FOR

GLOBE VALVE, 1/2-INCH

Grove Valve and Regulator Company Part Number 11193A046B

NASA Drawing Number 10428576

June 27, 1967

CHRYSLER CORPORATION SPACE DIVISION - NEW ORLEANS, LOUISIANA

FOREWORD

The tests reported herein were conducted for the John F. Kennedy Space Center by Chrysler Corporation Space Division (CCSD), New Orleans, Louisiana. This document was prepared by CCSD under contract NAS 8-4016, Part VII, CWO 271620.

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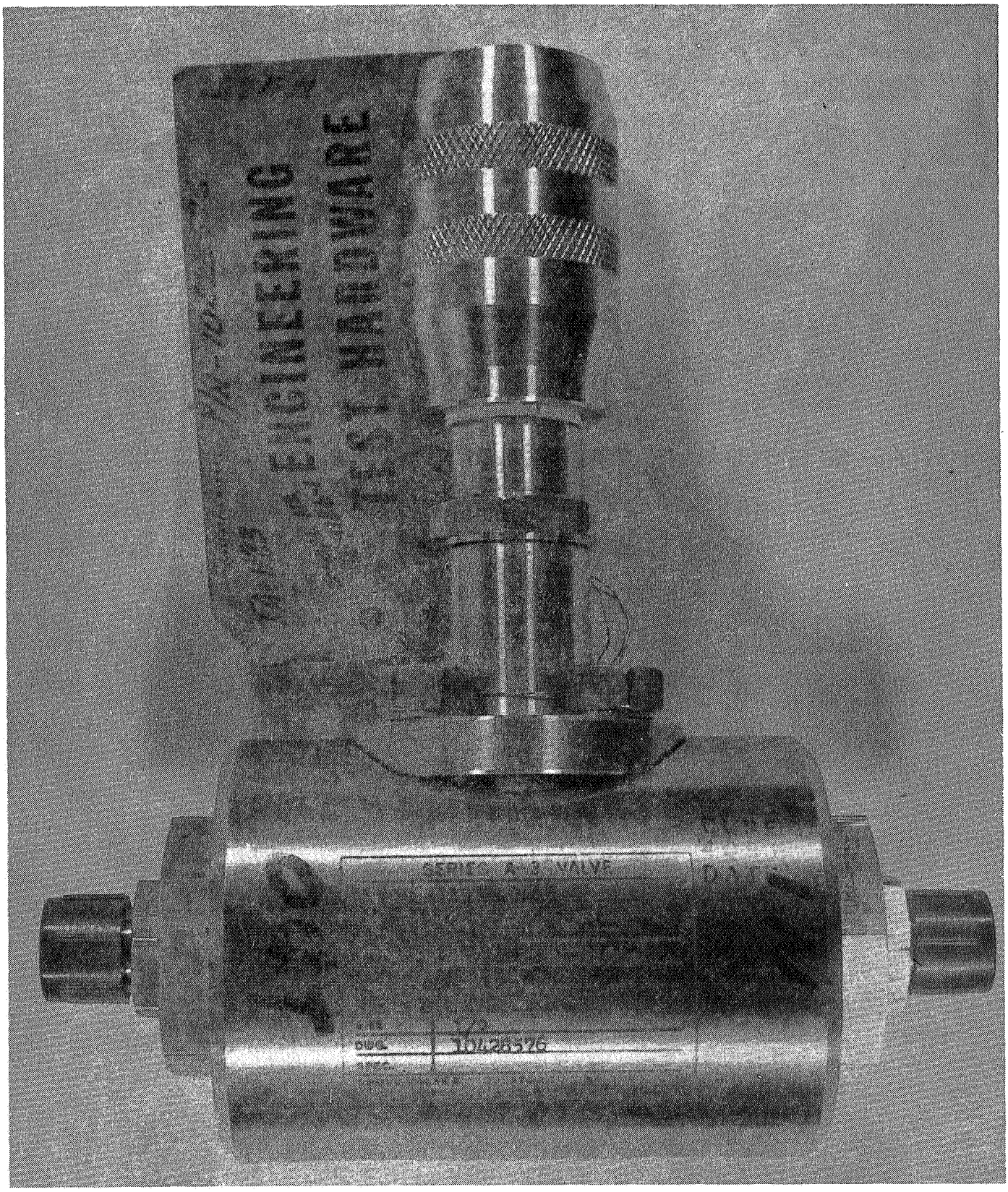


½ - Inch Globe Valve 10428576

CHECK SHEET

FOR

GLOBE VALVE, 1/2-INCH

MANUFACTURER: Grove Valve and Regulator Company
MANUFACTURER'S PART NUMBER: 11193A046B & 75M15978-6
NASA DRAWING NUMBER: 10428576
TESTING AGENCY: Chrysler Corporation Space Division, New Orleans, Louisiana
AUTHORIZING AGENCY: NASA KSC

I. FUNCTIONAL REQUIREMENTS

A.	OPERATING MEDIA:	Gaseous nitrogen and helium
B.	OPERATING PRESSURE:	6000 psig
C.	LEAKAGE:	None
D.	PROOF PRESSURE:	9000 psig
E.	BURST PRESSURE:	24,000 psig
F.	TORQUE REQUIREMENTS	
	BREAKAWAY:	Undetermined
	RUNNING:	Undetermined
	SEATING:	Undetermined
G.	FLOW CAPACITY C_v:	2.9

II. CONSTRUCTION

A.	BODY MATERIAL:	316 stainless steel
B.	SEATS:	KEL-F
C.	O-RINGS:	Nitrile rubber
D.	LOCK NUT:	316 stainless steel
E.	VALVE PLUG:	17-4PH stainless steel
F.	VALVE GUIDE:	316 stainless steel
G.	STEM:	17-4PH stainless steel
H.	JACK SCREW:	17-4PH stainless steel
I.	BUSHING:	Phosphor bronze
J.	HANDLE:	316 stainless steel
K.	FITTINGS:	AND 10050-8, inlet and outlet

III. ENVIRONMENTAL CHARACTERISTICS

OPERATING TEMPERATURE: -20 to 120°F

IV. LOCATION AND USE: Used in the Pneumatic Supply System of John F. Kennedy Space Center Launch Complex 34.

TEST SUMMARY

1/2-INCH GLOBE VALVE

10428576

Environment	Units	Operational Boundary	Test Objective	Test Results	Remarks
Receiving Inspection	1	NASA Drawing No. 10428576	Visual and dimensional examination for compliance	Satisfactory	No visual deviations from the specification or good workmanship
Roof Pressure	1	9000 psig for 5 minutes	Check for leakage or distortion	Satisfactory	No leakage or distortion
Functional Test	1	Leakage: Bubble tight at 6000 psig	Check for leakage and establish opening, closing and running torque values	Satisfactory	No leakage
Flow Test	1	To be determined	Determine C_v for the valve	Satisfactory	Maximum C_v of 3.26 was found at 3 gpm. Average C_v was 3.0
Surge Test	1	0 to 6000 psig in 100 milliseconds. 10 cycles with valve closed, and 10 cycles with valve partially open	Determine if specimen operation is impaired by surge	Satisfactory	No leakage or apparent distortion due to surge
Low Temperature	1	-20(+0, -4)°F	Determine if environments cause degradation or deformation	Satisfactory	No leakage or apparent distortion due to thermal change
High Temperature	1	+160(+4, -0)°F	Determine if environments cause degradation or deformation	Satisfactory	No leakage or apparent distortion due to thermal change
Life Cycle Test	1	Operating the specimen for 1000 cycles with 6000 psig on inlet to valve	Determine if environment causes degradation or distortion due to accumulative wear	Satisfactory	No leakage or apparent distortion due to life cycling
Burst Pressure Test	1	Minimum of 24,000 psig for 5 minutes	Determine the structural integrity of the specimen	Unsatisfactory	The valve stem packing gland failed at 15,000 psig

SECTION I

INTRODUCTION

1.1 SCOPE

1.1.1 This report describes the testing of 1/2-inch Glob Valve 10428576. Tests included were those necessary to determine whether the valve will satisfy the operational and environmental requirements of the John F. Kennedy Space Center.

1.1.2 One specimen was tested.

1.2 ITEM DESCRIPTION

Globe Valve 10428576 has a 1/2-inch nominal size inlet port. It has a design operating pressure of 6000 psig and is rated for use with nitrogen and helium.

1.3 APPLICABLE DOCUMENTS

The following documents contain the test requirements for Globe Valve 10428576:

a. KSC-STD-164(D), Standard Environmental Test Methods for Ground Support Equipment Installations at Cape Kennedy

b. Component Specification 10428576

c. Cleanliness Standard MSFC-STD-164(D)

d. Test Plan CCSD-FO-1123-1F

e. Test procedure TP-RE-CCSD-FO-1123-2F

SECTION II

RECEIVING INSPECTION

2.1 TEST REQUIREMENTS

The test specimen shall be visually and dimensionally inspected for conformance with NASA drawing 10428576 and applicable specifications. Inspection shall not include disassembly of the specimen.

2.2 TEST PROCEDURE

A visual and dimensional inspection was performed to determine compliance with NASA drawing 10428576 and applicable vendor drawings to the extent possible without disassembling the test specimen. Inspections were also made for poor workmanship and manufacturing defects. Equipment used in the inspections is listed in table 2-1.

2.3 TEST RESULTS

The specimen complied with NASA drawing 10428576. No evidence of poor workmanship or manufacturing defects was observed.

2.4 TEST DATA

The data presented in table 2-2 were recorded during the inspection.

Table 2-1. Receiving Inspection Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Cal. Date
1	Steel Scale	Brown & Sharpe	300	NASA 101-1013	7/23/64

Table 2-2. Specimen Dimensions

Measurements	Actual Value (Inches)
Overall height (open)	9-9/32 in.
Overall height (closed)	8-3/4 in.
Overall length	9-3/8 in.
Cylinder diameter	3-1/4 in.

SECTION III

PROOF PRESSURE TEST

3.1 TEST REQUIREMENTS

3.1.1 The test specimen shall be subjected to a proof pressure of 9000 psig.

3.1.2 The pressure shall be simultaneously supplied to the inlet and outlet ports, with the valve in the open position and shall be maintained for 5 minutes.

3.1.3 The specimen shall be inspected for leakage and distortion.

3.2 TEST PROCEDURE

3.2.1 The test specimen was installed in the test setup as shown in figures 3-1 and 3-2 utilizing the equipment listed in table 3-1.

3.2.2 Hand valve 7 and regulator 21 were closed.

3.2.3 The test specimen and hand valves 5, 6, 8, 9, 10, 11 and 23 were opened and the system was filled with de-ionized water 2. All air was bled from the system.

3.2.4 Hand valves 5, 8, 9, 11 and 23 were closed.

3.2.5 Hand valve 7 was opened, and 3000 psig GN_2 was monitored on gage 14.

3.2.6 Regulator 21 was adjusted until a pressure of 100 psig was indicated on gage 15.

3.2.7 Switch 17 was closed. Solenoid valve 18 was opened and pump 19 was started.

3.2.8 The pump continued to operate until a pressure of 9000 psig was indicated on gage 3. Switch 17 was then opened to stop pumping.

3.2.9 The 9000 psig pressure was maintained for 5 minutes, and the specimen was checked for leakage.

3.2.10 Hand valves 9, 11 and 23 were opened to vent the system, and the specimen was then checked for distortion.

3.2.11 All data were recorded.

3.3 TEST RESULTS

The specimen did not leak and there was no evidence of distortion.

3.4 TEST DATA

The test data are presented in table 3-2 as recorded during the test.

Table 3-1. Proof Pressure and Burst Test Equipment List

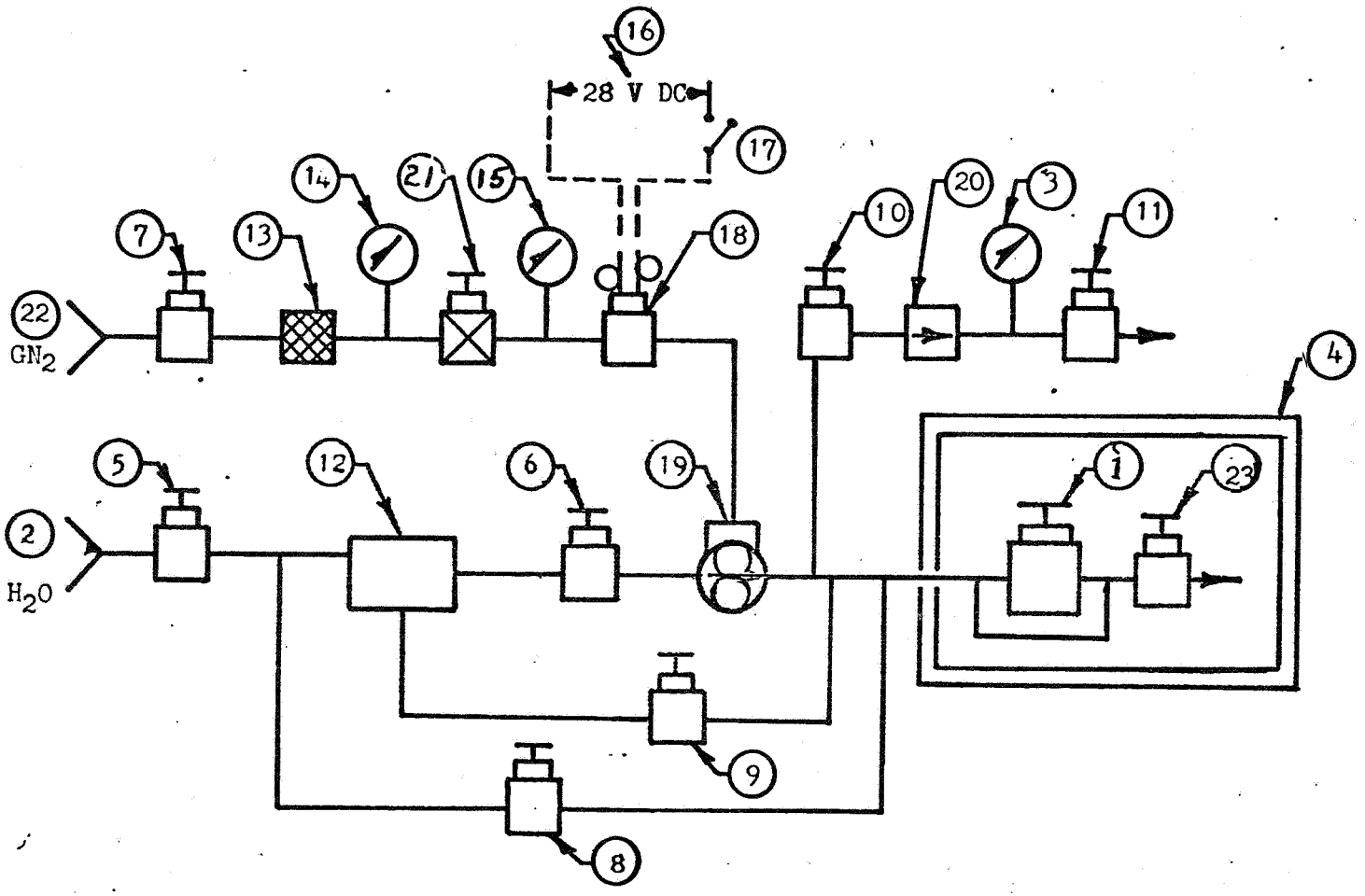
Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Grove Valve and Regulator Co.	11193A-046B	109186-1	1/2-inch globe valve
2	Water Supply		NA	NA	Deionized and tap water
3	Hydrostatic Pressure Gage	Astra	NA	011893-A	Range: 0-to 100,000-psig ±2.0% FS Gal. date: 11/2/66
4	Burst Chamber	CCSD	NA	201344	3 ft. x 3 ft. x 3 ft.
5	Hand Valve	Aminco	50011A	NA	1/4-inch
6	Hand Valve	Aminco	50011A	NA	1/4-inch
7	Hand Valve	Aminco	50011A	NA	1/4-inch
8	Hand Valve	Aminco	50011A	NA	1/4-inch
9	Hand Valve	Aminco	50011A	NA	1/4-inch
10	Hand Valve	Aminco	50011A	NA	1/4-inch
11	Hand Valve	Aminco	50011A	NA	1/4-inch
12	Mater Reservoir	CCSD	NA	NA	2-gallon
13	Pneumatic Filter	Bendix Corp.	1731260	NA	2-micron
14	Pressure Gage	Ashcroft	10575	NA	0-to 5000-psig ±2% FS
15	Pressure Gage	Duragauge	8990	NA	0-to 300-psig ±2% FS
16	Power Supply	CCSD	NA	NA	28 vdc
17	Switch	Cutler - Hammer	NA	NA	SPST
18	Solenoid Valve	Marotta Valve Co.	207803	NA	2-way normally closed

Table 3-1. Proof Pressure and Burst Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
19	Hydrostatic Pump	Sprague Engr. Corp.			Air operated; maximum pressure 50,000 psig
20	Check Valve	Aminco	44-6305	NA	1/4-inch
21	Regulator	Marotta Valve Co.	NA	NA	3000-psig inlet; 0-to 200-psig outlet
22	GN_2 Pressure Source	Air Products	NA	NA	3000 psig
23	Hand Valve	Aminco	50011A	NA	1/4-inch

Table 3-2. Proof Pressure Test

Pressure	9,000 psig/ 5 minutes
Leakage	**Zero**
Distortion	None



Note: Port lines 1/2-inch; all other lines 1/4-inch.
Refer to table 3-1 for item identification.

Figure 3-1. Proof Pressure and Burst Test Schematic

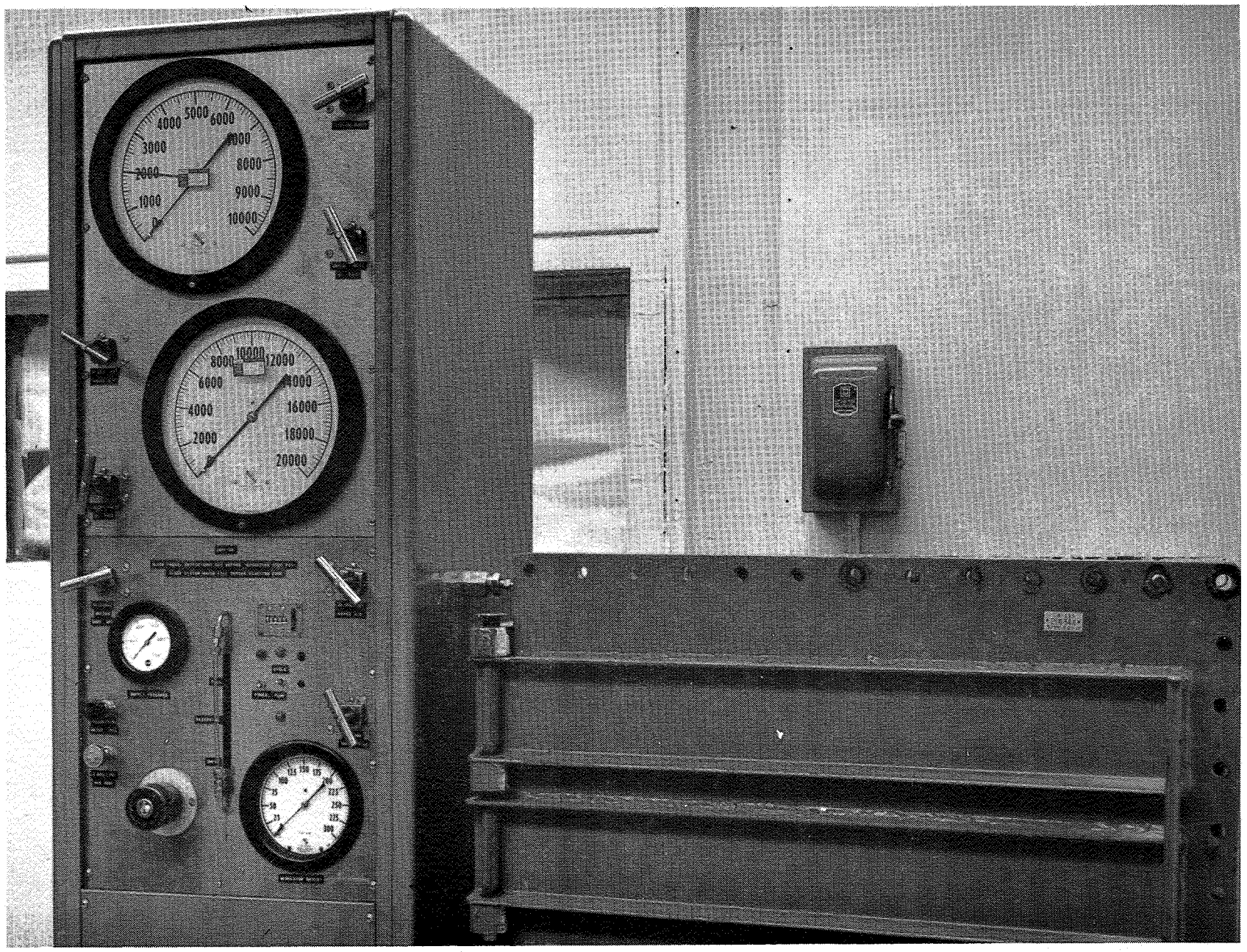


Figure 3-2. Proof Pressure and Burst Test Console

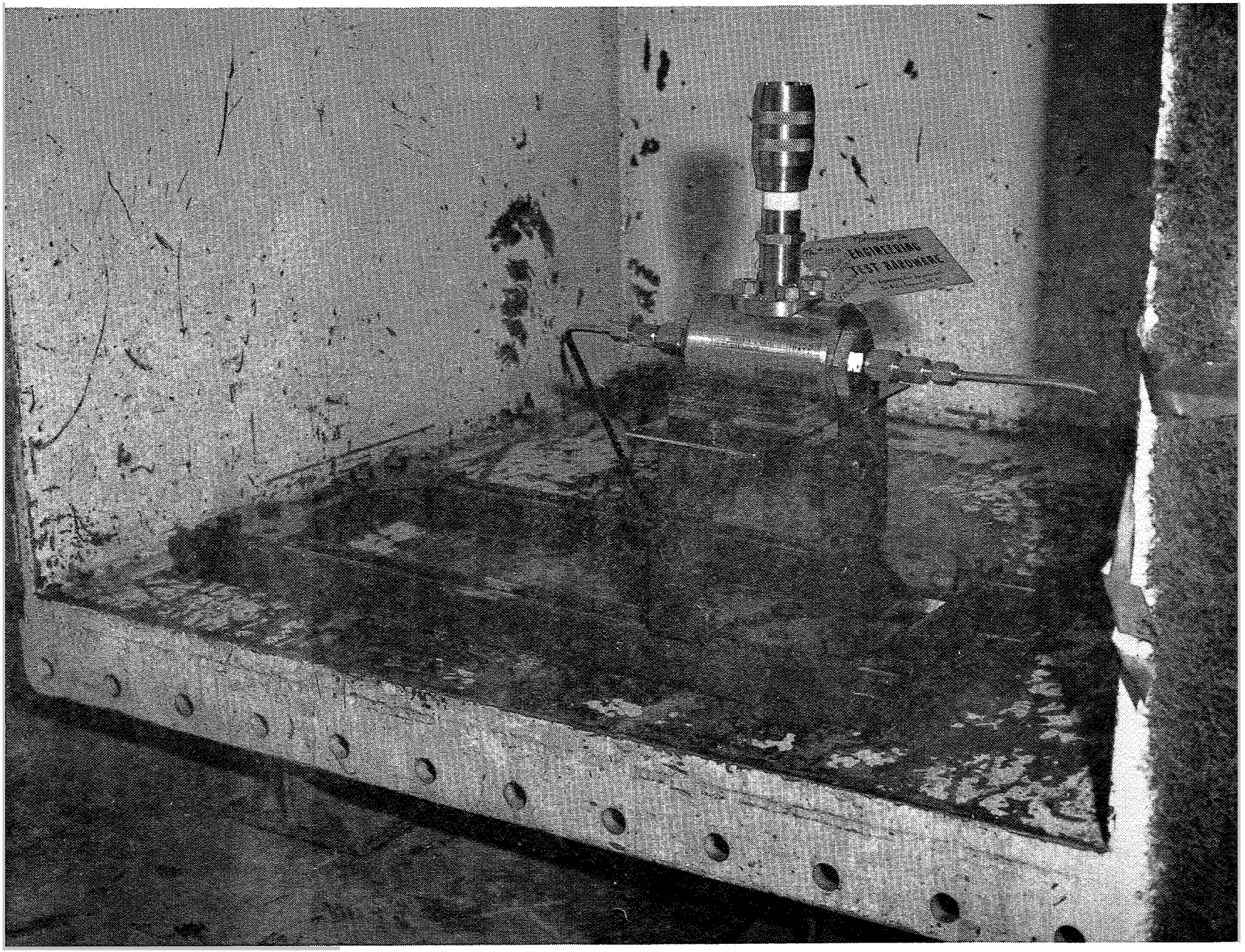


Figure 3-3. Proof [illegible]ure and Burst Test Setup

SECTION IV

FUNCTIONAL TEST

4.1 TEST REQUIREMENTS

4.1.1 The test specimen shall be inspected for leakage with the outlet port of the specimen pressurized to 6000 psig, specimen closed, and the inlet port vented. Leakage shall be recorded (see figure 4-2).

4.1.2 The test specimen shall be inspected for leakage with the inlet port of the specimen pressurized to 6000 psig, specimen closed, and the outlet part vented. Leakage shall be recorded.

4.1.3 The opening, closing, and normal running torque of the valve shall be determined with the inlet port pressurized to 6000 psig and then relieved to zero psig.

4.1.4 The procedure described in 4.1.1 and 4.1.2 shall be repeated for the initial functional test and performed for all subsequent functional tests. The procedure described in 4.1.3 shall be performed ten times initially and three times for all subsequent functional tests.

4.2 TEST PROCEDURE

4.2.1 The test setup was assembled as shown in figures 4-1 and 4-2 using the equipment listed in table 4-1 except for thermocouple 17 and thermal chamber 18. All hand valves were closed. Flex hose 20 (port A) was connected to the outlet port of the specimen and flex hose 21 (port B) was connected to the inlet port.

4.2.2 The hand wheel of the test specimen was replaced with torque wrench 13 and the test specimen was closed using the maximum seating torque of 15 inch-pounds.

4.2.3 Regulators 6 and 15 were adjusted for zero outlet pressure.

4.2.4 Hand valve 3 was slowly opened, and gage 5 indicated 7000 psig.

4.2.5 Regulator 6 was adjusted to establish 6000 psig as indicated on pressure gage 7.

4.2.6 Hand valve 10 was opened to determine the amount of leakage by the displacement of water in graduated cylinder 11.

4.2.7 Regulator 6 was adjusted for zero outlet pressure and hand valve 8 was opened to vent the specimen.

4.2.8 Hand valves 8 and 10 were closed.

4.2.9 Flex hose 20 (port A) was connected to the inlet port of the specimen and flex hose 21 (port B) was connected to the outlet port.

4.2.10 The procedures described in 4.2.5 through 4.2.8 were repeated.

4.2.11 By adjusting regulator 6, the specimen pressure, as indicated on pressure gage 7, was slowly increased to 6000 psig.

4.2.12 The breakaway torque of the specimen was measured by slowly applying the maximum torque required to unseat the specimen.

4.2.13 After the breakaway torque was measured, the specimen was completely opened. The running torque required from breakaway until the specimen fully opened was measured.

4.2.14 The specimen was closed and the closing running torque was measured.

4.2.15 Hand valve 9 was opened and closed to vent the outlet pressure of the specimen. Hand valve 10 was opened.

4.2.16 The specimen was slowly opened until bubbles appeared in water tank 12.

4.2.17 The specimen was slowly closed and the torque required to stop the bubbles in water tank 12 was measured. This was the closing torque for the specimen at operating pressure.

4.2.18 Regulator 6 and hand valve 10 were closed.

4.2.19 Hand valves 8 and 9 were opened and closed to vent the specimen.

4.2.20 The procedures described in 4.2.12 through 4.2.14 were repeated to determine breakaway and running torque values for the unpressurized specimen.

4.2.21 Flex hose 20 (port A) was disconnected and capped, and flex hose 19 (port C) was connected to the inlet port of the specimen.

4.2.22 Regulator 6 was adjusted to establish 100 psig on pressure gage 7.

4.2.23 Hand valve 14 was opened.

4.2.24 Regulator 15 was slowly adjusted, establishing a 2-psi@:reading on pressure gage 16.

4.2.25 Hand valve 10 was opened.

4.2.26 The test specimen was slowly opened until bubbles appeared in water tank 12.

4.2.27 The test specimen was slowly closed and the torque required to stop the bubbles was measured. This was the closing torque for the specimen when it was unpressurized.

4.2.28 Regulators 6 and 15 were closed and hand valve 8 was opened to vent the supply pressure.

4.2.29 Hand valves 8, 10, and 14 were closed.

4.2.30 Flex hose 19 (port C) was disconnected and port A of flex hose 20 was uncapped and connected to the inlet of the specimen.

4.2.31 The test specimen was closed using the maximum seating torque as specified.

4.2.32 The procedures described in 4.2.11 through 4.2.31 were performed ten times and the procedures described in 4.2.1 through 4.2.10 were repeated once for the initial functional test.

4.2.33 For all subsequent teats, the procedures described in 4.2.11 through 4.2.30 were performed three times and 4.2.1 through 4.2.10 once.

4.3 TEST RESULTS

Test results were satisfactory during the initial functional test.

4.4 TEST DATA

Initial functional test data are presented in table 4-2.

.Table 4-1. Functional Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Grove Valve and Regulator Co.	11193A04 6B	109186-1	1/2-inch globe valve
2	He Source	CCSD	NA	NA	7000-psig
3	Hand Valve	Combination Pump and Valve Co.	380-3	NA	1 1/2-inch
4	Filter	Microporous	4813F-2M	NA	2-micron
5	Pressure Gage	Duragauge	NA		0-to 10,000-psig ±0.2% FS Cal. date: 1/25/67
6	Pressure Regulator	Tescom Corp.	26-1002	1002	7000-psig inlet 0-to 7000-psig outlet
7	Pressure Gage	Heise	H35840	200616-E	0-to 10,000-psig ±0.25% FS Cal. date: 2/1/67
8	Hand Valve	Robbins Aviation	SSKG-250-4T	NA	1/4-inch
9	Hand Valve	Robbins Aviation	SSKG-250-4T	NA	1/4-inch
10	Hand Valve	Robbins Aviation	SSKG-250-4T	NA	1/4-inch
11	Graduated Cylinder	Pyrex Co.	NA	NA	For leakage measurement
12	Water Tank	CCSD	NA	NA	Leakage detector
13	Torque Wrench	Armstrong	SR-100	NASA 95-1318B	Replaces hand wheel of specimen (when required) Cal. date: 3/7/67
14	Hand Valve	Robbins Aviation	SSKG-250-4T	NA	1/4-inch

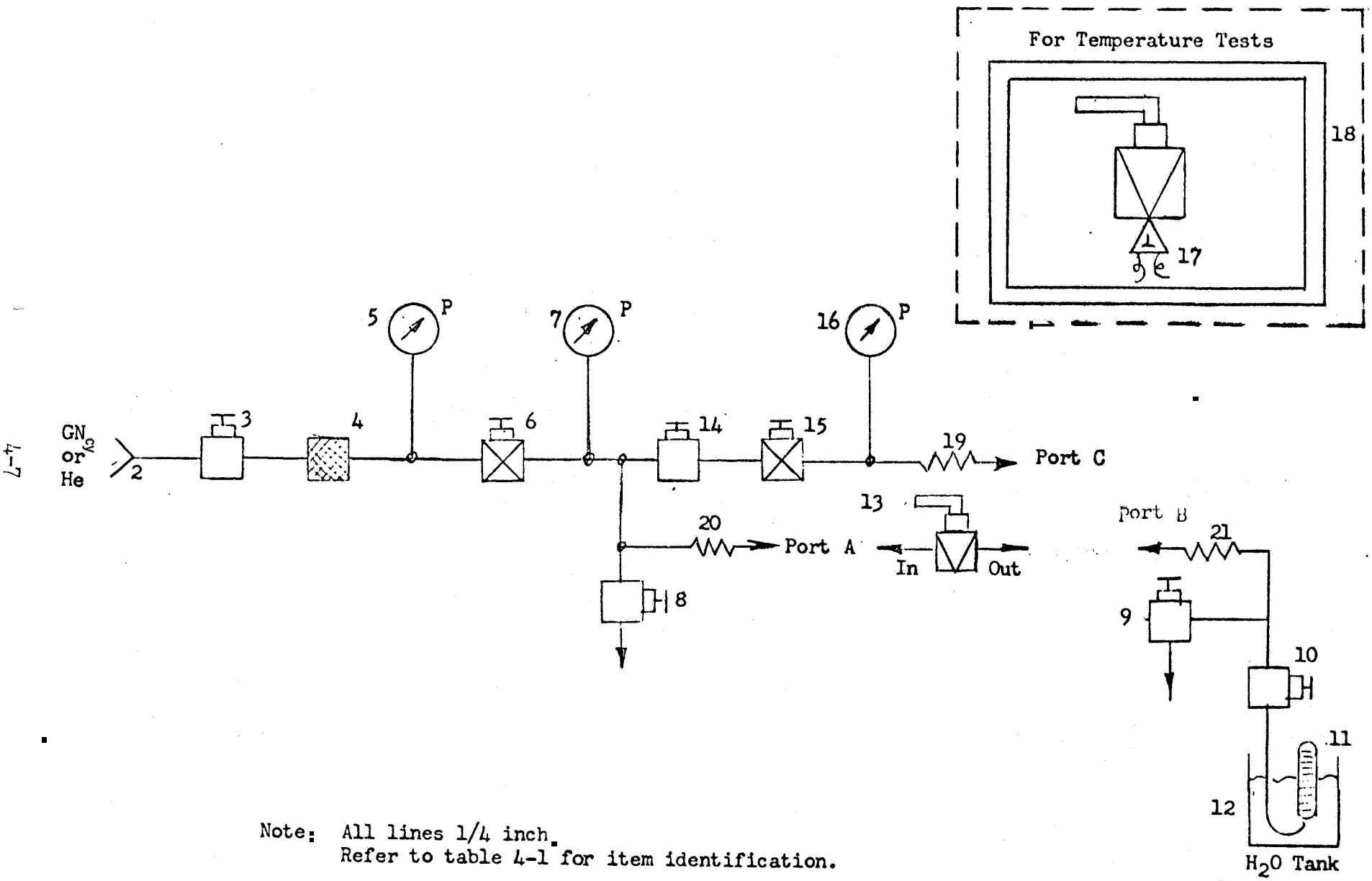
Table 4–1. Functional Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Psrt No.	Serial No.	Remarks
15	Pressure Regulator	Tescom Corp.	26-1002	1009	100-psig inlet 0-to 10-pig outlet
16	Pressure Gage	Marsh Instrument	NA	NASA 08-113-1142B	0-to 30-psig ±0.5% FS Cal. date: 1/10/67
17	Thermocouple	Honeywell Corp.	3011a	NA	-50 to 200 (±2.5)°F (temperature tests only)
18	Thermal Chamber	Conrad Corp.	NA	NASA 08-113-2049-41	-30 to 140°F (temperature tests only)
19	Flex Hose	NA	MA	NA	1/4-inch
20	Flex Hose	NA	NA	NA	1/4-inch
21	Flex Hose	NA	NA	NA	1/4-inch

Table 4-2. Initial Functional Test **Data**

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In.Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	120	6000	28	7	13	120
	120	0	65	1.0	1.0	-
		2	-	-	-	3.0
2	120	6000	40	9	14	20
	120	0	65	0.75	0.5	-
		2	-	-	-	4.0
3	120	6000	60	9	13	25
	120	0	60	0.5	1.0	-
		2	-	-	-	4.0
4	120	6000	45	8	12	22
	120	0	43	1.0	1.0	-
		2	-	-	-	4.0
5	120	6000	60	8	13	25
	120	0	60	0.75	0.75	-
		2	-	-	-	5.0
6	120	6000	55	7	13	27
	120	0	60	0.75	0.75	-
		2	-	-	-	5.0
7	120	6000	50	7	12	22
	120	0	60	0.5	0.5	-
		2	-	-	-	4.0
8	120	6000	60	7	11	22
	120	0	70	0.5	0.5	-
		2	-	-	-	4.0
9	120	6000	60	8	12	18
	120	0	60	0.5	0.5	-
		2	-	-	-	5.0
10	120	6000	60	7	13	18
	120	0	65	0.5	0.5	-
		2	-	-	-	0.4

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	60	6000	0	None
	60	0	6000	None
2	60	6000	0	None
	60	0	6000	None



Note: All lines 1/4 inch.
Refer to table 4-1 for item identification.

Figure 4-1. Functional Test Schematic

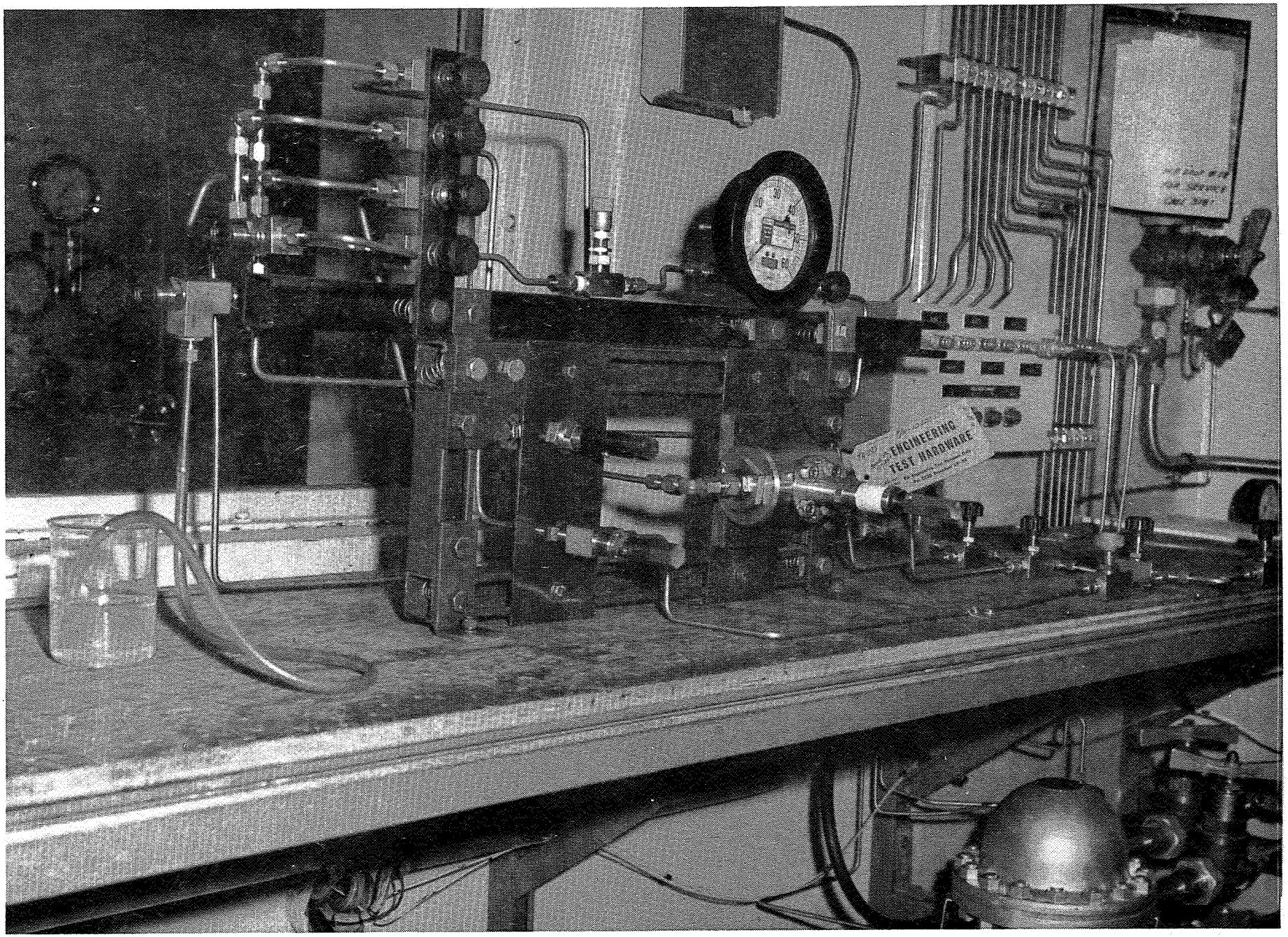


Figure 4-2. Functional Test Setup

SECTION V

FLOW TEST

5.1 TEST REQUIREMENTS

5.1.1 A flow test shall be performed on the specimen.

5.1.2 The valve capacity (C,) of the specimen shall be determined.

5.1.3 A flow rate versus pressure drop curve shall be developed.

5.2 TEST PROCEDURE

5.2.1 The test specimen was installed in the test setup as shown in figures 5-2 and 5-3 using the equipment listed in table 5–1. Each hand valve and regulator 5 were closed.

5.2.2 The test specimen was opened.

5.2.3 Hand valve 3 was opened and gage 4 indicated 100 psig.

5.2.4 Regulator 5 was used to vary the flow through the system.

5.2.5 Nineteen readings of inlet pressure, pressure drop and water temperature were recorded from flowneter 7, gages 9, 10 and 11, and thermocouple 8.

5.3 TEST RESULTS

5.3.1 The flow coefficient (C_V) of the 1/2-inch globe valve was an average of 3.0 when calculated over a flow range between 3 and 18 gallons per minute.

5.3.2 A flowversus pressure drop curve was developed.

5.4 TEST DATA

5.4.1 Data recorded during the flow test and after the functional test which followed the flow test are presented in tables 5-2 and 5-3. Flow rate versus pressure drop is shown in figure 5-1.

5.4.2 The flow coefficient (C_V) was computed using the following formula:

$$C_V = Q\sqrt{\frac{\rho_T}{\rho \Delta P}}$$

Where:

Q = measured flow rate (gpm)
ΔP = Pressure drop across the specimen (paid)
ρ_T = Density of the water at the temperature indicated by the temperature probe.
ρ = Density of the water at 60°F

Table 5-1. Flow Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Grove Valve and Regulator Co.	11193A 046B	109186-1	1/2-inch globe valve
2	Water Supply	NA	NA	NA	NA
3	Hand Valve	Williams co.	200SP	NA	2-inch
4	Pressure Gage	Heise	NA	NASA 08-113 93-1092-C	0-to 3000-psig +0.2% FS Cal. date: 9/21/66
5	Pressure Regulator	Denison Div., American Brake Shoe Co.	FCC122 3106	NA	1-inch
6	Pressure Gage	Ashcroft	NA	NASA 08-113- 95-1209-E	0-to 1000-psig ±1.0% FS Cal. date: 10/30/66
7	Thermocouple	West Instrument Corp.	30112	NA	-50 to +200 (±2.5)°F Cal. date: 10/3/66
8	Turbine Flowmeter	COX Instrument Division	16-SCRX	3498	0-to -50 gpm Cal. date: 9/18/66
9	Pressure Gage	Heise	NA	NASA 08-113- 95-1637-E	0-to -100 psig +0.2% FS Cal. date: 9/21/66
10	Pressure Gage	Heise	NA	NASA 38-33 95-1083-C	0-to -100 psig +0.2% FS Cal. date: 9/21/66
11	Pressure Gage	Heise	NA	NASA 38-113 93-1064-C	0-to -100 psig ±0.2% FS Cal. date: 9/21/66
12	Hand Valve	Williams Co.	200 SP	NA	2-inch

Table **5–2. Flow Test Data**

Flow (gpm)	Specimen **Pressure**		Tare (psi)	ΔP (psi)	Media Temperature (°F)	Flow coef-fici-ent (Cv)
	Upstream (psig)	Downstream (psig)				
3	3.7	2.5	0.2	1.0	57	3
4	5.8	3.6	0.4	1.8	57	2.98
5	8.4	4.9	0.5	3.0	57	2.88
6	11.4	6.4	0.7	4.3	57	2.89
8	18.6	9.9	1.4	7.3	57	2.96
10	28.3	17.7	2.3	11.3	57	2.97
12	39.4	20.1	3.2	16.1	57	2.99
15	60.0	30.0	5.0	25.0	57	3.00
17	75.0	37.6	6.3	31.1	57	3.05
18	85.6	42.3	7.2	36.1	57	2.99
17	76.0	37.4	6.5	32.1	57	2.96
15	59.1	29.5	4.8	24.8	57	2.99
12	39.0	19.7	3.4	15.9	57	2.99
10	27.7	17.3	2.5	10.9	57	3.08
8	18.3	9.8	1.8	6.7	57	3.09
6	11.3	6.5	1.1	3.7	57	2.89
5	8.6	5.2	0.9	2.5	57	2.37
4	5.9	3.8	0.6	1.5	57	3.26
3	4.1	2.8	0.4	0.9	57	3.16

Table 5-3. **Data on Functional Test** Following **the** Flow **Test**

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In.Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	10	6000	11	6	10.5	14
		0	5	0.5	1.0	-
		2	-	-	-	4.0
2	10	6000	11	5	11	19
		0	5.5	0.25	0.75	-
		2	-	-	-	3.75
3	10	6000	10	7	12	20
		0	5	0.25	0.5	-
		2	-	-	-	4.25

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	10	6000	0	None
	10	0	6000	None
2				

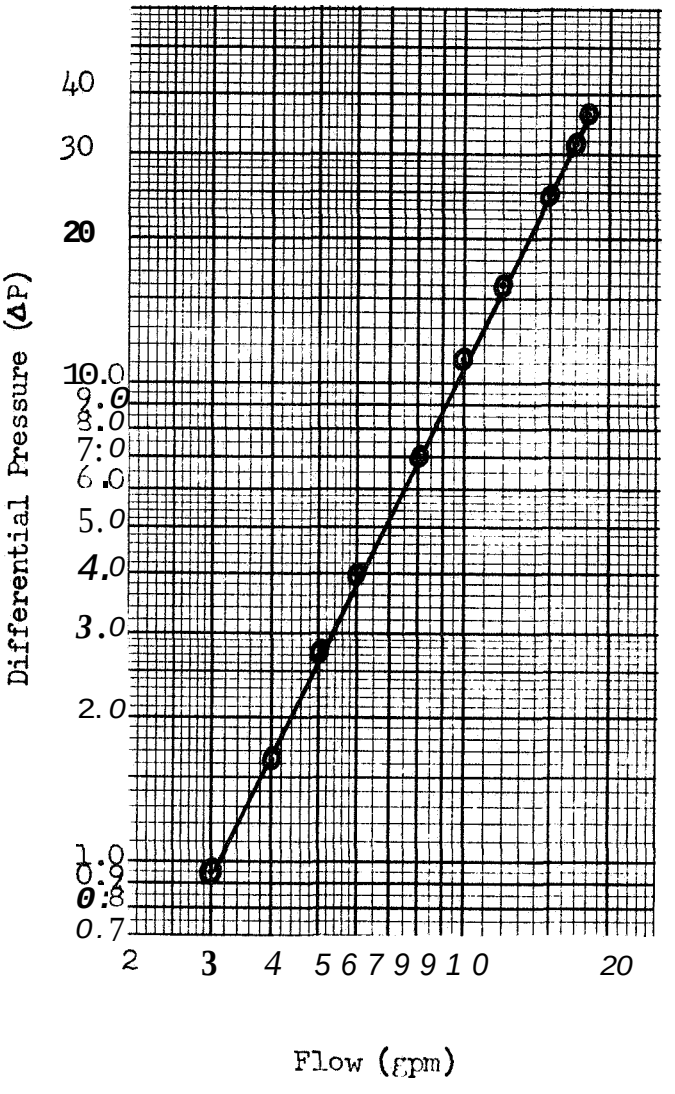
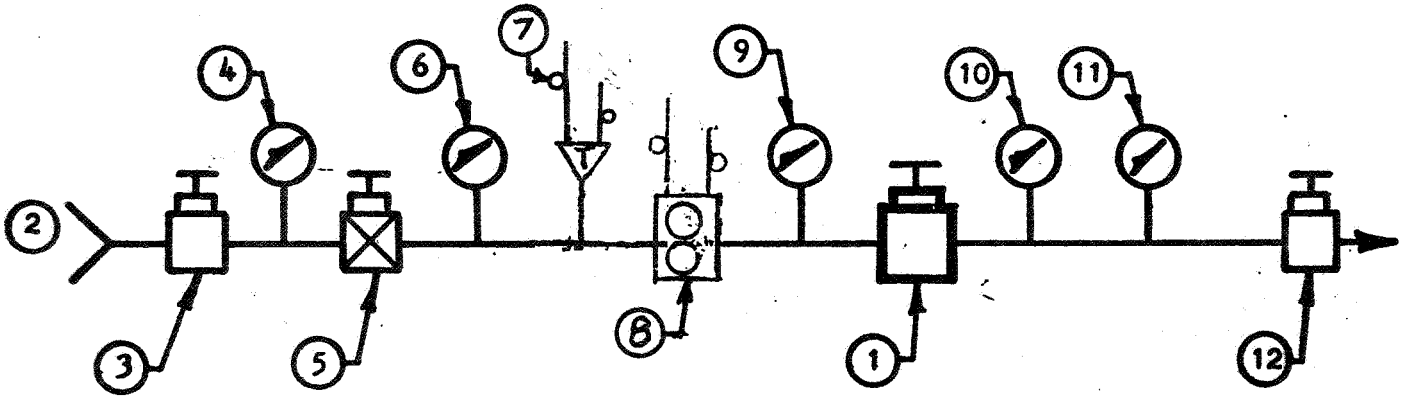


Figure 5–1. **Flow** Rate **Versus** Pressure Drop



Note: Flow lines 1/2-inch, gage lines 1/4-inch.
Refer to table 5-1 for item identification.

Figure 5-2. Flow Test Schematic

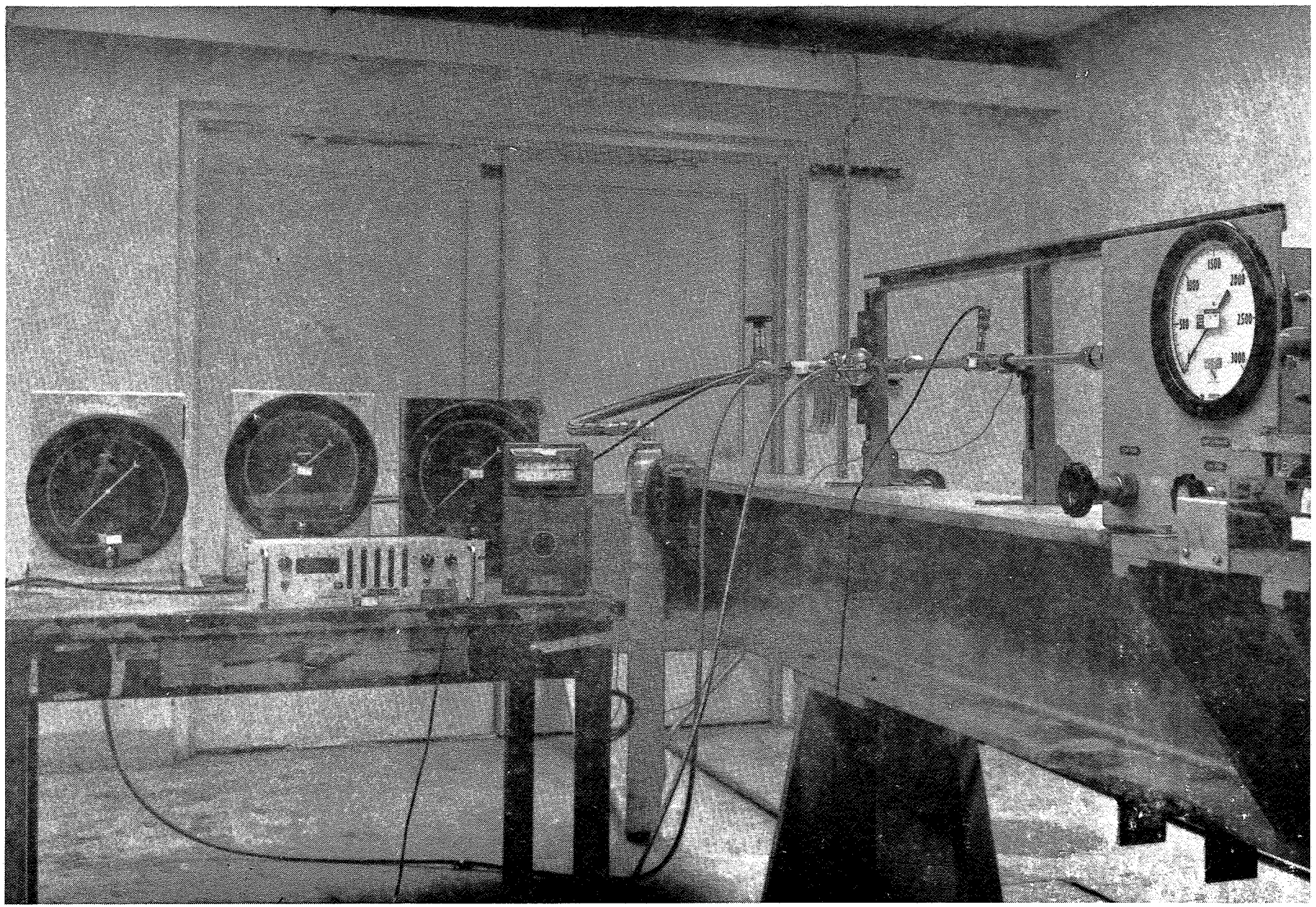


Figure 5-3. Flow Test Setup

SECTION VI

SURGE TEST

6.1 **TEST REQUIREMENTS**

6.1.1 The test specimen shall be subjected to 20 pressure surges, 10 with the specimen closed and 10 with the specimen partially opened and the vent port of solenoid valve capped.

6.1.2 Each pressure surge shall be a pressure increase from zero to 6000 psig within 100 milliseconds.

6.1.3 The downstream side of the specimen shall be vented after each surge when the specimen is partially opened.

6.2 TEST PROCEDURE

6.2.1 The test specimen was installed in the test setup as shown in figures 6-2 and 6-3 using the equipment listed in table 6-1. All hand valves, regulators and the specimen Were closed for zero pressure.

6.2.2 Hand valve 2 was opened.

6.2.3 Pressure gage 4 indicated the supply pressure of 7000 psig.

6.2.4 Regulator 5 was adjusted until gage 6 showed 6000 psig.

6.2.5 Hand valve 7 was opened and switch 18 was closed, energizing solenoid valve 8 into the open position. The inlet port of the specimen was pressurized to 6000 psig.

6.2.6 The output from pressure transducer 15 and the time for each run were recorded on oscillograph 16.

6.2.7 Switch 18 was opened to deactuate solenoid valve 8 and hand valve 7 was closed.

6.2.8 The procedures 6.2.5 through 6.2.7 were repeated 10 times.

6.2.9 The test sample was partially opened (cracked), and the vent port of solenoid valve 8 was capped.

6.2.10 The procedures 6.2.5 through 6.2.7 were repeated for 10 additional cycles, opening hand valve 12 after each cycle to vent the downstream pressure from the specimen.

6.2.11 The specimen was examined for distortion after each cycle, and functionally tested prior to and after surge testing.

6.3 TEST RESULTS

The specimen was cycled ten times in the closed position with a pressure of 0-to 6000 psig at an average rise rate of 95 milliseconds. The second ten cycles were performed with the valve in the partially opened position, and pressurized from 0-to 6000 psig at an average rise rate of 95 milliseconds. No specimen damage or degradation of performance resulted from the test.

6.4 TEST DATA

6.4.1 A typical surge waveform as recorded during the test is shown in figure 6-1.

6.4.2 Data recorded during the pre-surge and post-surge functional tests are presented in tables 6-2 and 6-3.

Table 6–1. Surge and Cycle Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Grove Valve and Regulator Co.	11193A0 46B	109186-1	1/2-inch globe valve
2	Hand Valve	Combination Pump and Valve Co.	380-3	NA	1 1/2-inch supply
3	Filter	Microporous	4813F-2M	NA	2-micron
4	Pressure Gage	Ashcroft	NA	NASA 08-113-200594-P	0–to 10,000 psig ±0.2% FS Gal. date: 12/8/66
5	Pressure Regulator	Tescom Corp.	26-1002	1004	7000–psig inlet 0–to 7000 psig outlet
6	Pressure Gage	Ashcroft	NA	NASA 08-113-200594-Q	0–to 10,000 psig 0.2% FS Cal. date: 12/8/66
7	Hand Valve	Robbins Aviation	SSKG 250-4T	NA	1/4-inch
8	Solenoid Valve	Marotta Valve Co.	MV-583	3696	3-way, 1/2-inch
9	Hand Valve	Robbins Aviation	SSKG 250-4T	NA	1/4-inch
10	Pressure Gage	Ashcroft	NA	NASA 08-113-200594-B	0–to 10,000 psig ±0.2% FS Cal. date: 12/8/66
11	Helium and Nitrogen Source	CCSD	NA	MA	7000 psig
12	Hand Valve	Robbins Aviation	SSKG 250-4T	NA	1/4-inch

Table 6-1. Surge and Cycle Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
13	Solenoid Valve	Marotta Valve Co.	MV-583	2916	3-way, 1/2-inch
14	Motor and Gear Reduction	Westinghouse	NA	NA	Refer to electrical schematic for identification
15	Pressure Transducer	Teledyne	176	652137	0-to 7,500 psig ±0.2% accuracy
16	Oscillograph Recorder	C. E. C.	5-124	NASA 017887	
17	Electrical. Supply	Plant Services	NA	NA	28 vdc and. 115 vac
18	Switch	Cutler - Hammer	NA	NA	

Table 6-2. Pre-Surge **Functional Test Data**

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	35	6000	21	8	14	23
		0	5	0.5	0.75	-
	10	2	-	-	-	20
2	37	6000	22	9	15	17
		0	5	0.5	0.75	-
	10	2	-	-	-	20
3	41	6000	26	9	15	23
		0	5	0.5	0.75	-
	10	2	-	-	-	20

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	35	6000	0	None
	35	0	6000	None
2				

Table 6-3. **Post-Surge Functional** Test Data

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	10	6	14	10
		0	6	0.5	0.5	-
		2	-	-	-	5
2	15	6000	11	7	13	14
		0	7	0.5	0.5	-
		2	-			3
3	15	6000	11	7	13	14
		0	7	0.5	0.5	-
		2	-	-	-	4

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	30	6000	0	None
	30	0	6000	None
2				

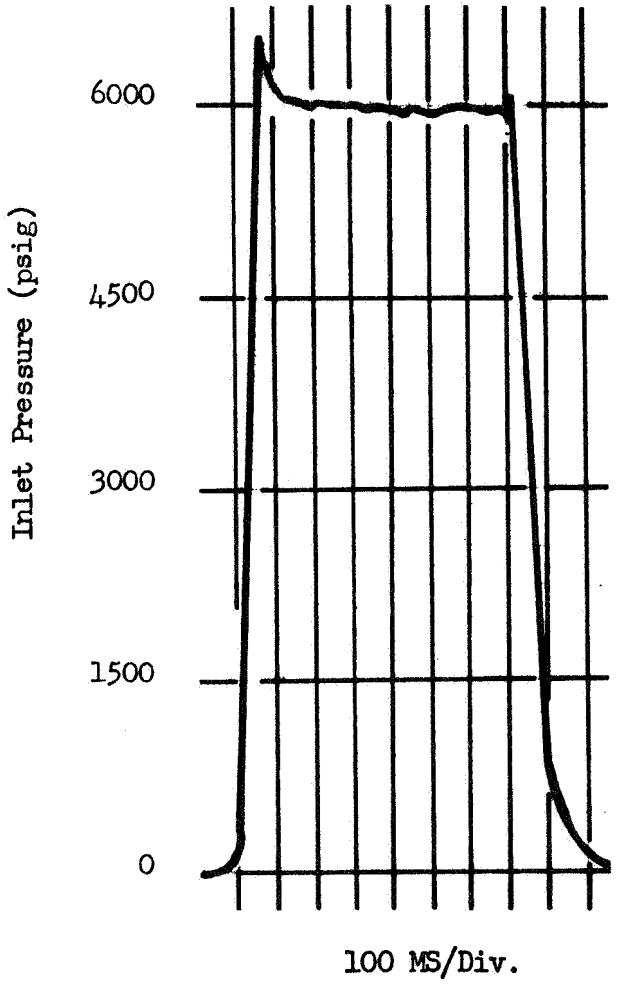
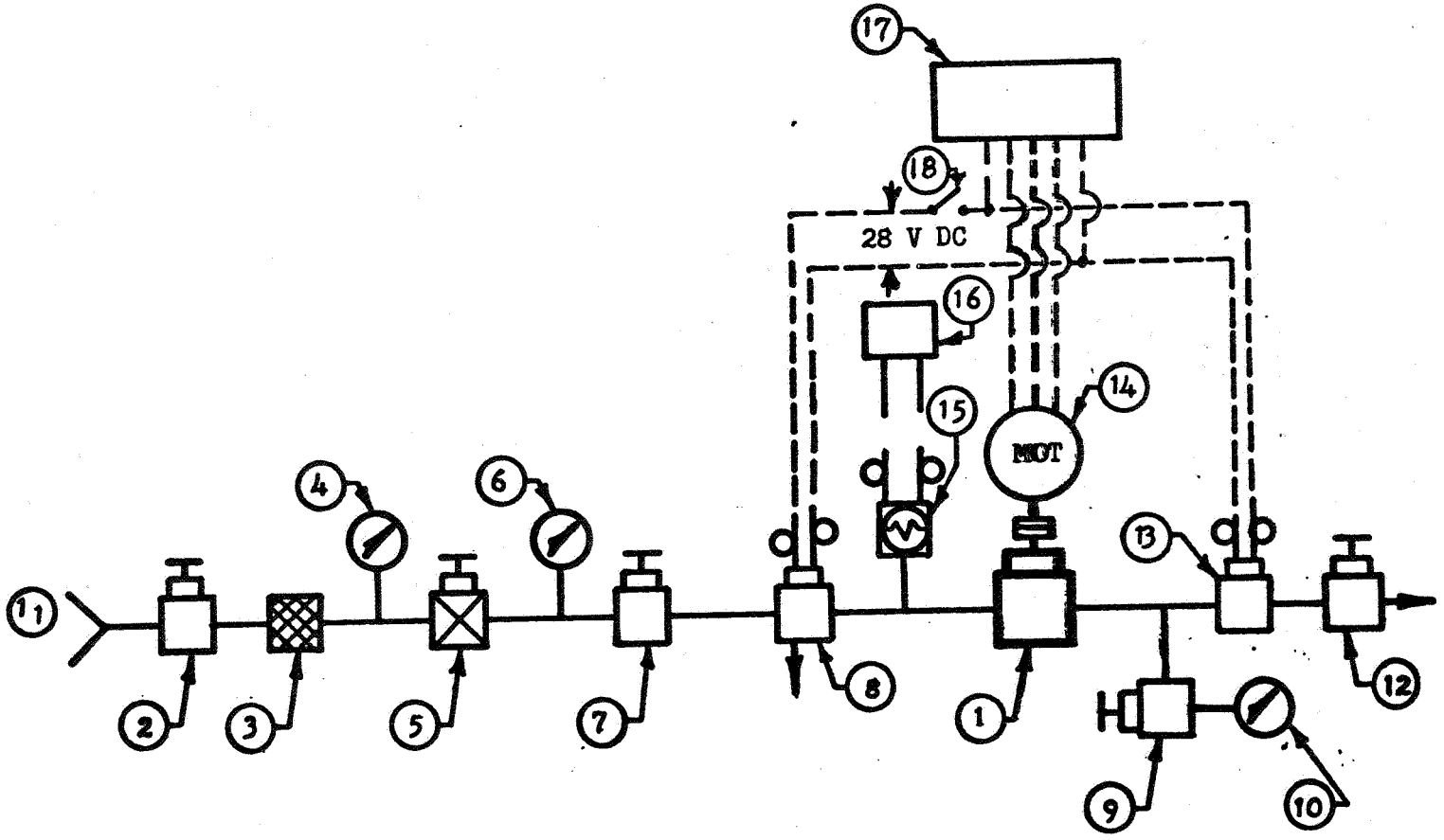
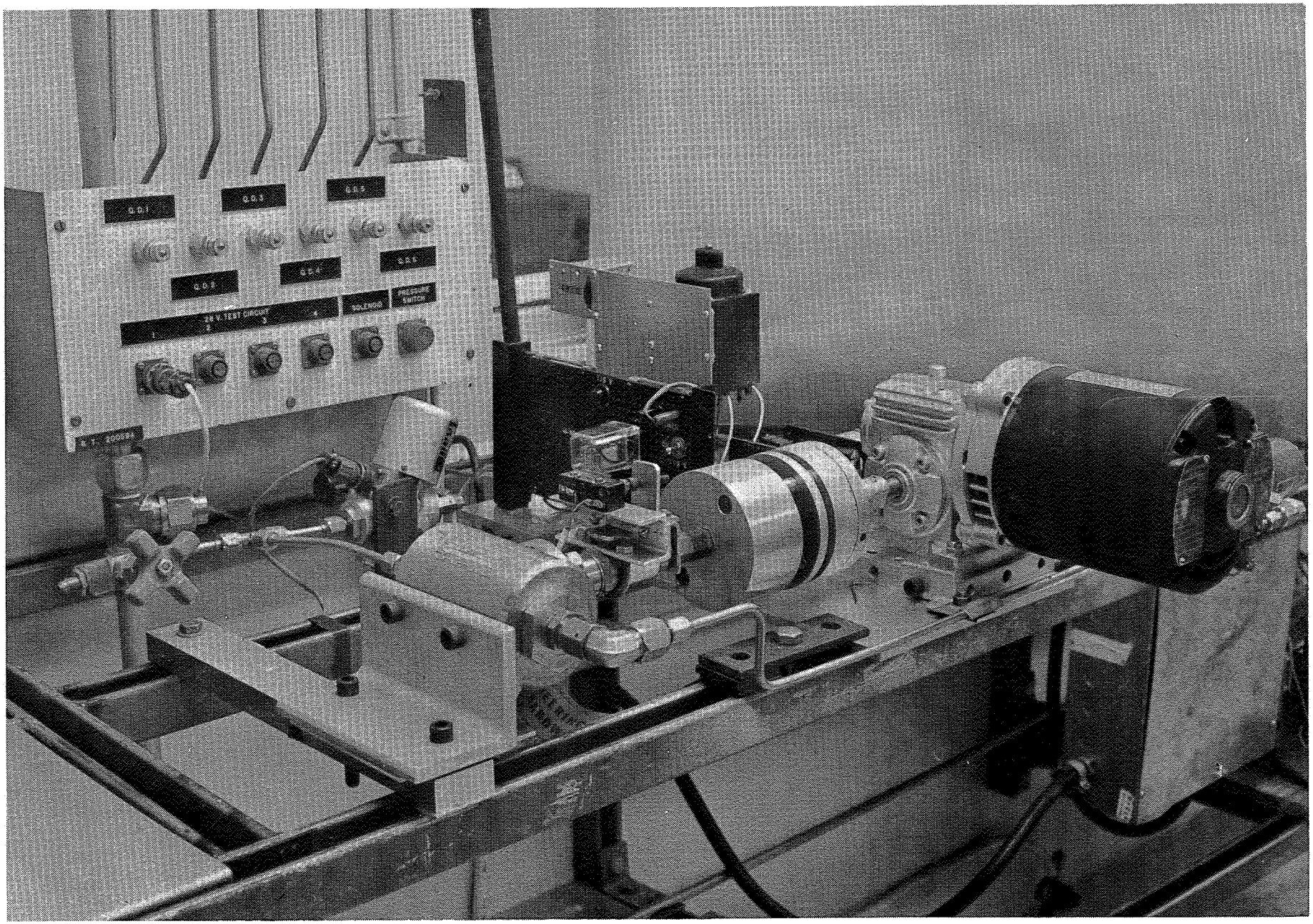


Figure 6-1, Typical *Surge* Waveform



Note: All lines 1/2-inch.
Refer to table 6-1 for item identification.

Figure 6-2. Surge and Life Cycle Test Schematic



6-3. Surge and Life Cycle Test Setup

SECTION VII

LOW TEMPERATURE TEST

7.1 TEST REQUIREMENTS

7.1.1 The test specimen shall be subjected to a low temperature test at -20(+0, -4)°F to determine whether the environment causes degradation or deformation.

7.1.2 The test specimen shall be subjected to a functional test in accordance with Section IV during the low temperature test, using helium as the test medium.

7.2 TEST PROCEDURE

7.2.1 The test specimen was installed in the test setup as shown in figures 4-1 and 7-1 using the test equipment listed in table 4-1.

7.2.2 With thermocouple 19 affixed to the specimen, thermal chamber 18 was cooled to -20°F and the relative humidity maintained at the prescribed 60 to 90 percent.

7.2.3 Temperature stabilization was achieved and a functional test was performed.

7.2.4 The chamber was returned to ambient temperature and a second functional test was performed.

7.2.5 The specimen was visually inspected within one hour of its return to ambient temperature.

7.3 TEST RESULTS

The specimen demonstrated no apparent adverse effects from thermal changes except for a slight increase in the low-pressure torque values as recorded in the functional test data.

7.4 TEST DATA

The data recorded during the test are presented in tables 7-1, 7-2, and 7-3.

Table 7-1. Pre-Low Functional Test Data

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	10	6	14	10
		0	6	0.5	0.5	-
		2	-	-	-	5
2	15	6000	11	7	13	14
		0	7	0.5	0.5	-
		2	-	-	-	3
3	15	6000	11	7	13	14
		0	7	0.5	0.5	-
		2	-	-	-	4

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	30	6000	0	None
	30	0	6000	None
2				

Table 7-2. Functional Test Data (-20°F)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	30	20	27	28
		0	11	7	3	-
		2	-	-	-	10
2	15	6000	23	17	24	40
		0	11	4	2	-
		2	-	-	-	15
3	15	6000	20	17	25	45
		0	11	3	2	-
		2	-	-	-	15

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	50	6000	0	None
	50	0	6000	None
2				

Table 7-3. Functional Test Data (Ambient Conditions)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	11	9	15	17
		0	7	0.5	1.0	-
		2	-	-	-	5
2	15	6000	8	8	14	25
		0	8	0.5	1.0	-
		2	-	-	-	5
3	15	6000	11	9	15	15
		0	7	0.5	1.0	-
		2	-	-	-	5

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	35	6000	0	None
	35	0	6000	None
2				

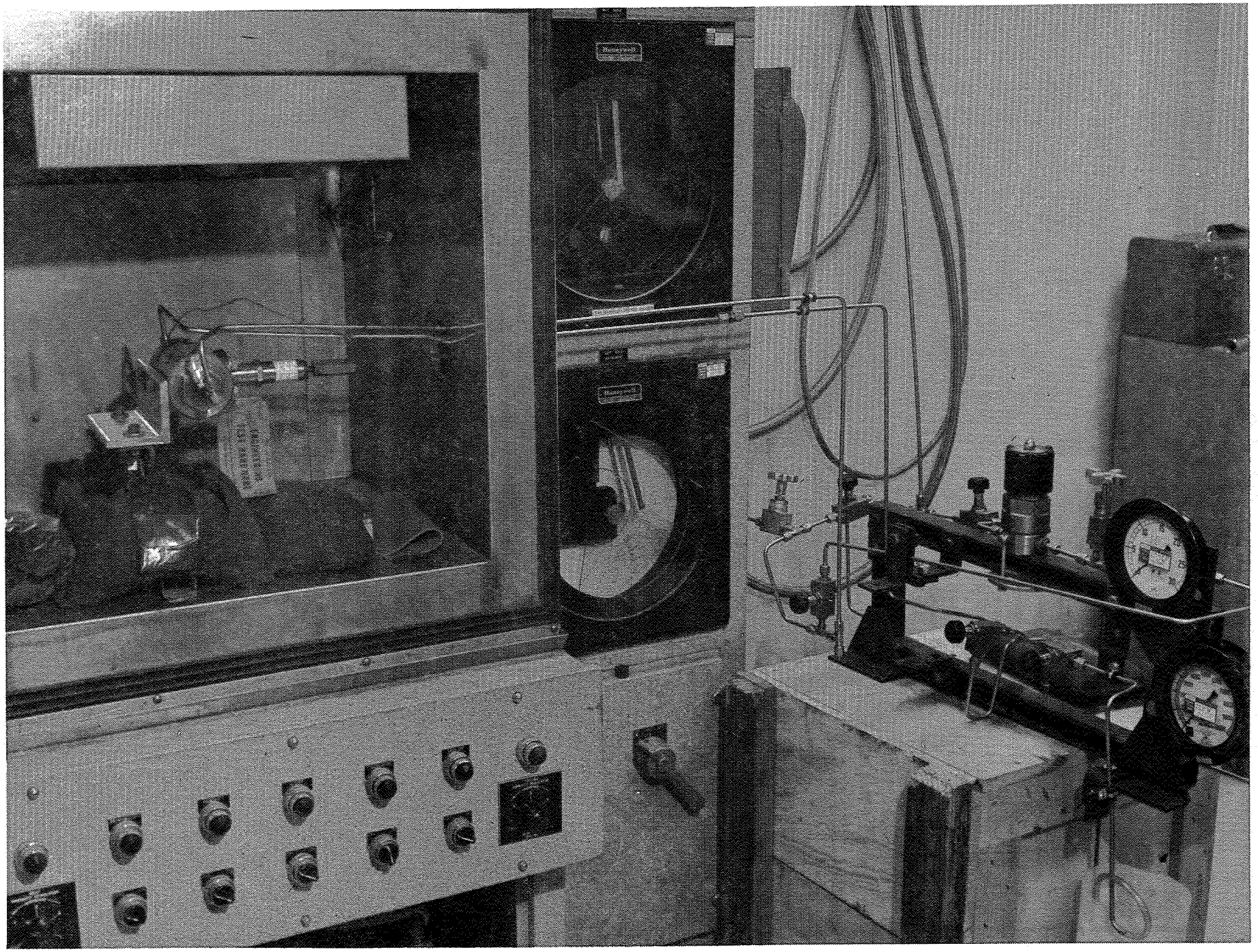


Figure 7-1. Low and High Temperature Test Setup

SECTION VIII

HIGH TEMPERATURE TEST

8.1 TEST REQUIREMENTS

8.1.1 The test specimen shall be subjected to a high temperature test at 160(+4, -0)°F for a period of 72(+2, -0) hours to determine if the environment causes degradation of performance,

8.1.2 The test specimen shall be subjected to a functional test in accordance with Section IV during and after the high temperature test using helium as the test medium.

8.2 TEST PROCEDURE

5.2.1 The test specimen **was** installed in the test setup as shown in figures 4-1 and 7-1 using the equipment listed in table 4-1.

8.2.2 With thermocouple 19 affixed to the specimen, the temperature of thermal chamber 18 **was** increased to 160°F at a rise rate of approximately 1° **per** minute. The humidity **was** maintained at 20 **percent.**

8.2.3 This temperature **was** maintained for 72 **hours** after temperature stabilization.

8.2.4 A functional test **was** performed while the specimen and chamber were maintained at 160°F.

8.2.5 **The chamber temperature was** returned to ambient conditions upon completion of the functional test.

R.2.6 Within one **hour** following **the** establishment of ambient conditions, a visual inspection and functional test **were** performed **on** the **specimen.**

8.3 **TEST** RESULTS

The specimen demonstrated no apparent adverse effects from **thermal changes except for a** alight **increase** in the high-**pressure torque values as recorded** in the functional test data.

8.k TEST DATA

The data recorded during the test are presented in tables 8-1 and **8-2.**

Table 8–1. Functional Test **Data** (160°F)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	11	7	15	15
		0	8	0.5	1.0	–
		2	–	–	–	3
2	15	6000	11	7	14	16
		0	9	0.5	1.0	–
		2	–	–	–	4
3	15	6000	11	7	14	20
		0	9	0.5	1.0	–
		2	–	–	–	5

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	30	6000	0	None
	30	0	6000	None
2				

Table 8–2. Functional Test Data (Ambient Conditions)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	11	7	15	15
		0	8	0.5	1.0	–
		2	–	–	–	3
2	15	6000	11	7	14	16
		0	9	0.5	1.0	–
		2	–	–	–	4
3	15	6000	11	7	14	20
		0	9	0.5	1.0	–
		2	–	–	–	5

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	30	6000	0	None
	30	0	6000	None
2				

SECTION IX

CYCLE TEST

9.1 TEST REQUIREMENTS

9.1.1 The test specimen shall be subjected to 1000 cycles during the cycle test.

9.1.2 Each cycle shall consist of pressurizing the inlet port to 6000 psig and then opening and closing the specimen. GN_2 shall be the test medium.

9.1.3 The specimen downstream pressure will be vented to below 3100 psig after each cycle.

9.1.4 A functional test, as specified in Section IV, shall be performed following the completion of 50, 100, 500 and 1000 cycles.

9.2 TEST PROCEDURE

9.2.1 The specimen was installed in the test setup as shown in figures 6-2 and 6-3 utilizing the equipment listed in table 6-1.

9.2.2 All hand valves and regulator 5 were adjusted for zero pressure.

9.2.3 Hand valve 2 was opened and gage 4 was monitored for a 7000 psig reading.

9.2.4 Regulator 5 was adjusted to establish a 6000 psig reading on gage 6 and hand valve 7 was opened.

9.2.5 The electrical network was adjusted to produce the following:

a. Solenoid valve 8 was actuated to pressurize the specimen to 6000 psig, as indicated on gage 6.

b. Solenoid valve 13 was actuated to close the outlet port during specimen opening and closing. Hand valve 12 was opened.

c. Switch 18 was closed to signal the 440 vac reversible electrical motor 14 to open and close the specimen.

d. Hand valve 9 was opened and solenoid valves 8 and 13 were deactuated to vent pressure from the specimen to below 3000 psig downstream, as indicated on gaga 10.

9.2.6 Functional tests were performed after 50, 100, 500 and 1000 cycles of the specimen.

9.3 TEST RESULTS

The specimen successfully withstood 1000 test cycles. No degradation in performance was noted.

9.4 TEST DATA

Functional test data after 50, 100, 500 and 1000 cycles are presented in tables 9-1, 9-2, 9-3, and 9-4.

Table 9-1. Functional Test Data (50 Cycles)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	21	18	23	20
		0	5	0.5	0.5	-
		2	-	-	-	10
2	20	6000	16	18	22	20
		0	8	0.5	0.5	-
		2	-	-	-	15
3	20	6000	17	17	22	20
		0	12	0.5	0.5	-
		2	-	-	-	15

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	15	6000	0	None
	15	0	6000	None
2				

Table 9-2. Functional Test Data (100 Cycles)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	18	10	14	15
		0	13	0.5	0.5	-
		2	-	-	-	10
2	15	6000	15	12	13	15
		0	12	0.5	0.5	-
		2		-	-	15
3	15	6000	12	9	13	15
		0	12	0.5	0.5	-
		2	-	-	-	13

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	15	6000	0	None
	15	0	6000	None
2				

Table 9-3. Functional Test Data (500 Cycles)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	18	15	25	15
		0	9	0.5	0.5	-
		2	-	-	-	15
2	15	6000	16	12	18	15
		0	8	0.5	0.5	-
		2	-	-	-	15
3	15	6000	14	12	18	15
		0	8	0.5	0.5	-
		2	-	-	-	15

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	15	6000	0	None
	55	0	6000	None
2				

Table 9-4. Functional Test Data (1000 Cycles)

Run	Applied Seating Torque (In. Lb.)	Specimen Inlet Press. (psig)	Opening Torque (In. Lb.)	Running Torque (In. Lb.)		Closing Torque (In. Lb.)
				Opening	Closing	
1	15	6000	12	7	16	16
		0	11	0.5	0.5	-
	10	2	-	-	-	10
2	16	6000	10	7	15	18
		0	6	0.5	0.5	-
	10	2	-	-	-	11
3	18	6000	10	8	16	18
		0	6	0.5	0.5	-
	11	2	-	-	-	10

Run	Applied Seating Torque (In. Lb.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	15	6000	0	None
	45	0	6000	None
2				

SECTION X

BURST TEST

10.1 TEST REQUIREMENTS

10.1.1 The specimen shall be subjected to a hydrostatic pressure of 24,000 psig.

10.1.2 The hydrostatic pressure shall be simultaneously applied to the specimen inlet and outlet ports with the valve in the open position. The pressure shall be maintained for 5 minutes.

10.2 TEST PROCEDURE

10.2.1 The test specimen was installed in the test setup as shown in figures 3-1, 3-2 and 3-3 utilizing the equipment listed in table 3-1.

10.2.2 Hand valve 7 and regulator 21 were closed.

10.2.3 The test specimen and hand valves 5, 6, 8, 9, 10, 11 and 24 were opened and the system was filledwith water. All air was bled from the system.

10.2.4 Hand valves 5, 8, 9, 11 and 24 were closed.

10.2.5 Hand valve 7 was opened, and 3000 psig GN_2 was monitored on gage 14.

10.2.6 Regulator 21 was adjusted until a pressure of 100 psig was indiciated on gage 15.

10.2.7 Switch 17 was then closed. Solenoid valve 18 was opened and pump 19 started.

10.2.8 The pump continued to operate until a pressure of 15,000 psig was reached and a report was heard from within the chamber. The pressure at this time fell and all attempts to bring the pressure up failed.

10.2.9 Hand valves 9, 11 and 24 were opened and the system was vented.

10.2.10 All data were recorded.

10.3 TEST RESULTS

The O-ring in the stem packing assembly blew-out due to looseness in the machining of the threaded section at 15,000 psig.

10.4 TEST DATA

10.4.1 The data recorded during the burst pressure test are recorded in table 10-1.

Required Burst Pressure (psig)	Actual Rupture Pressure (psig)	Results
24,000	15,000	Specimen failed around the valve stem packing.

SECTION XI

SEAT EROSION TEST

11.1 TEST REQUIREMENTS

11.1.1 A seat erosion test will be performed on the test specimen to determine whether high velocity GN_2 flow causes degradation or deformation.

11.1.2 The specimen shall be set to flow approximately 100 SCFM of GN_2 with an inlet pressure of 6000 psig and an outlet pressure below 50 psig. The flow-rate shall be maintained for four hours.

11.1.3 A functional test shall be performed in accordance with Section IV immediately before and within one hour following this test, and the seat of the specimen shall be inspected for deterioration. If leakage is encountered during the functional test preceding this test or the functional test following this test, the specimen's soft goods shall be replaced and the functional test repeated.

11.2 TEST PROCEDURE

11.2.1 The test setup was assembled as shown in figure 11-1 and 11-2 using the equipment listed in table 11-1.

11.2.2 Hand valve 3 was closed and pressure regulator 5 was adjusted for zero outlet pressure.

11.2.3 Hand valve 3 was opened.

11.2.4 Pressure gauge 8 read over 6000 psig.

11.2.5 Pressure regulator 5 was adjusted to establish 6000 psig on pressure gauge 6.

11.2.6 Test specimen 1 was slowly opened until a reading of 21.7 was indicated on pressure gauge 7 and a temperature reading of approximately zero degrees was indicated on temperature recorder 11, to establish a flow of 100 SCFM.

11.2.7 The flow was continued for four hours. Pressure and temperature readings were monitored from pressure gauge 7 and temperature recorder 11, for an increase in flow rate which might indicate erosion of the valve seat.

11.2.8 Hand valve 3 was closed and test specimen 1 was removed from the system.

11.2.9 A functional test was performed within one hour following this test (see 11.1.3).

11.2.10 Test specimen 1 was disassembled. The valve seat was inspected and photographed.

11.2.11 All test data were recorded.

11.3 TEST RESULTS

The specimen withstood the velocity flow of 100 SCFH for a period of four hours with no degradation or deformation to the valve seat.

11.4 TEST DATA

The test data recorded during the seat erosion test and functional tests before and after the seat erosion test are recorded in tables 11-2 through 11-4. A photograph of the seat after test completion is shown in figure 11-3.

Table 11-1. Seat Erosion Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Grove Valve and Regulator Co.	11193A0 46B	USA 10428576	1/2-inch Globe Valve
2	GN_2 Source	Air Products	NA	NA	7000 psig
3	Hand Valve	Cardair	3510-0077	NA	1-1/2-inch
4	Filter	Permanent Filter Division	9377-3154	CPB-010	2 micron
5	Pressure Regulator	Tescom Corp.	26-1021-10	1529	7000 psig inlet 3 to 6000-psig outlet
6	Pressure Gauge	Heise	H-34955	014231	3-to 10,000 psig ± 2% FS accuracy Cal. date: 7/17/67
7	Pressure Gauge	Heise	NA	95-1409 -B	0-to 100 psig ± ½% FS accuracy Cal. date: 5/18/67
8	Pressure Gauge	Heise	H-35980	015536	3-to 10,000 psig ± 2% FS accuracy Cal. date: 8/1/67
9	Nozzle	Flow-Dyne Engineering Inc.	XN1604 30-5A	2375	Calibrated nozzle to flow 100 SCFM of GN_2 at inlet pressure of less than 50 psig. Throat diam. 0.4545.
10	Thermocouple	Minneapolis Honeywell	10112	NA	-50 to 100°F
11	Temperature Readout	West Instrument Company	NA	019457	-100 to 400 F Cal. date: 10/16/67

Table 11-2. Functional Test Data Sheet (Pre-Seat Erosion Test)

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	25	0	6000	0
2	25	6000	0	0

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
	25	6000	20	3	7	25
	10	0	2	0	0	10
1	25	2	3	0.5	0.5	15
	25	6000	12	3	8	25
	10	0	2	0	0	10
2	15	2	3	0.5	0.5	15
	25	6000	12	3	7	25
	10	0	2	0	0	10
3	15	2	3	0.5	0.5	15

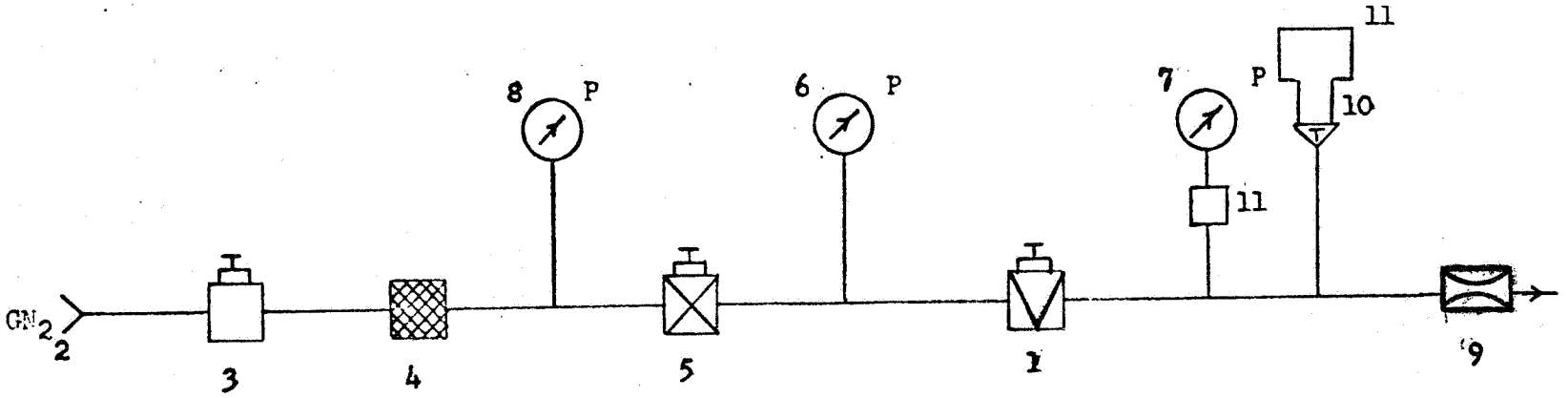
Table 11-3. Functional Test **Data** Sheet (Post-Seat **Erosion Test)**

Run	Applied Seating Torque (in-lb)	Inlet Pressure (psig)	Outlet Pressure (psig)	Leakage (scim)
1	25	0	6000	0
2	25	6000	0	0

Run	Applied Seating Torque (in-lb)	Specimen Inlet Pressure (psig)	Opening Torque (in-lb)	Running Torque (in-lb)		Closing Torque (in-lb)
				Opening	Closing	
	25	6000	15	2	8	25
	10	0	2	0	0	5
1	25	2	3	0.5	0.5	8
	25	6000	12	3	8	25
	10	0	2	0	0	5
2	8	2	3	0.5	0.5	8
	25	6000	12	3	8	25
	10	0	2	0	0	5
3	8	2	3	0.5	0.5	8

Table 11-4. Four Hour Seat Erosion Test Data

Half Hour Readings	Specimen Inlet Pressure (psig)	Specimen Outlet Pressure (psig)	Temperature		Flow Rate (SCFM)
			F	Rankine	
1	6000	21.9	6	465	100 SCFM (± 5 SCFM) through calibration flow nozzle .4545 inch diameter
2	6000	22.6	-5	455	
3	6000	22.7	-5	455	
4	6000	22.9	-7	455	
5	6000	22.5	-2	458	
6	6000	22.8	-2	458	
7	6000	22.6	5	455	
8	6000	21.8	3	457	
9	6000	22.0	0	460	



Note: Refer to table 11-1 for item identification.

Figure 11-1. Seat Erosion Test Schematic

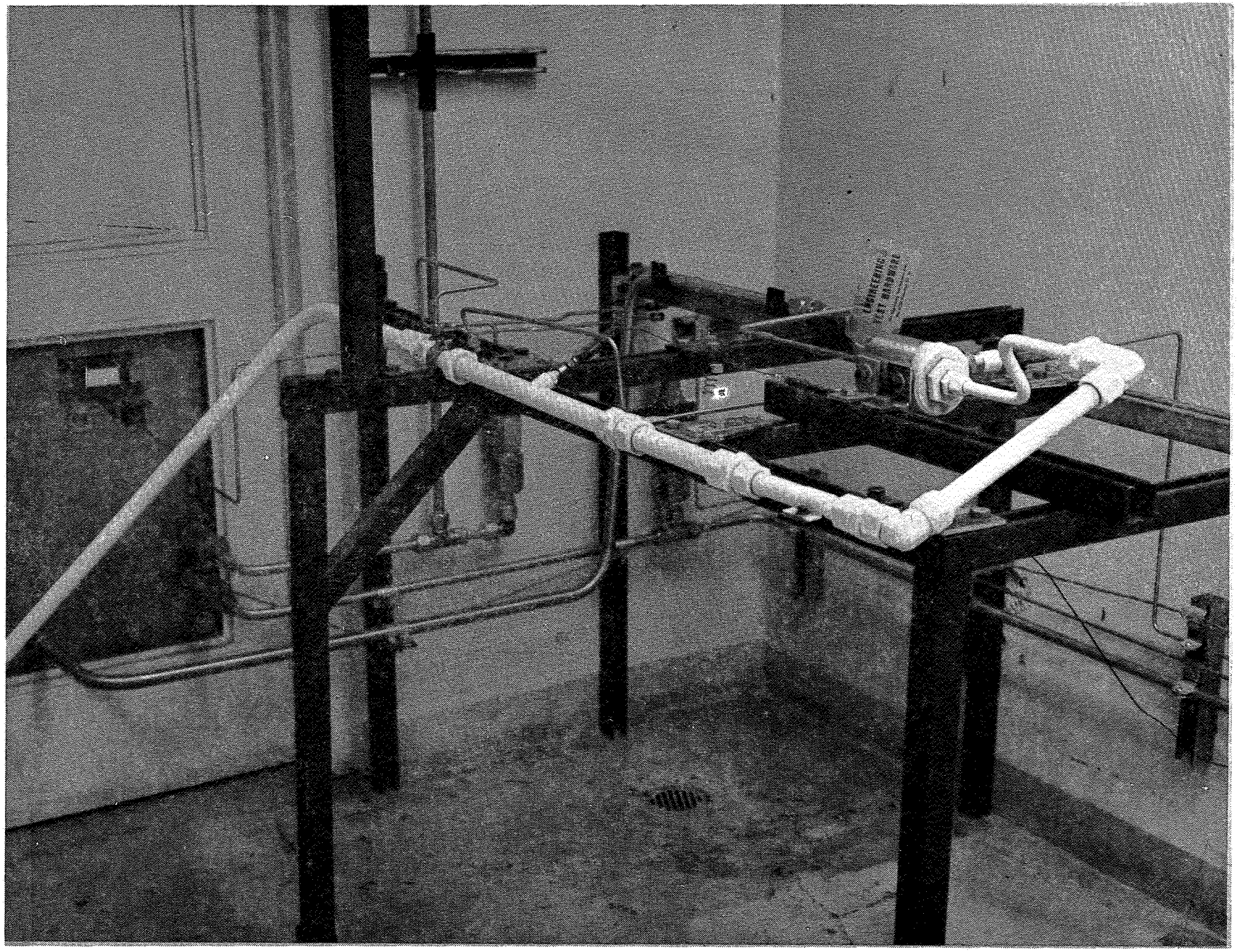


Figure 11-2. Seat Erosion Test Setup

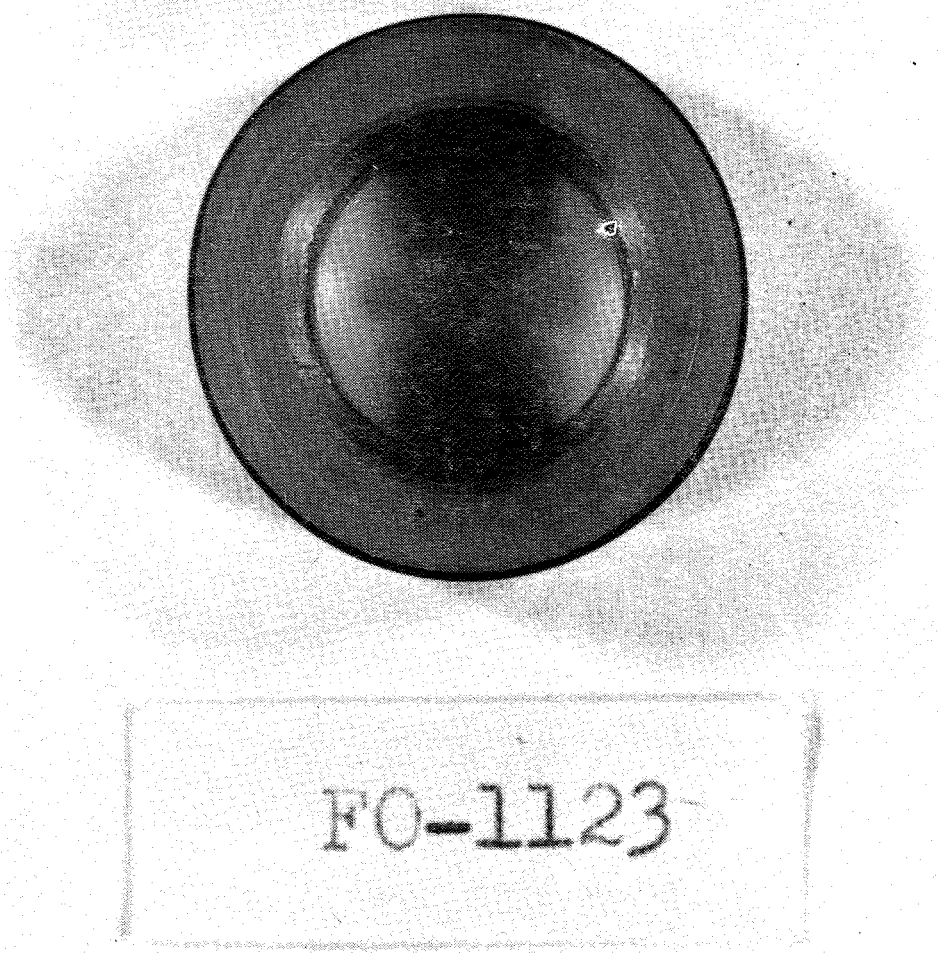


Figure 11-3. Seat After Seat Erosion Test

SECTION XII

BURST TEST

12.1 TEST REQUIREMENTS (See Section X, Technical Report TR-RE-CCSD-FO-1123-3)

12.2 TEST PROCEDURE (See Section X, Technical Report TR-RE-CCSD-FO-1123-3 and Publication Change to Technical Report TR-RE-CCSD-FO-1123-3)

TEST RESULTS

A burst test was performed following the seat erosion test in conformance with Section X. The valve failed during burst testing when the bonnet O-ring blew out at 14,600 psig. It appeared that the valve guide expanded under pressure. Minimum allowable burst pressure is 24,000 psig. The valve failed in the same manner as during the first burst test. (See Test Results, 10.3).

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APPROVAL

TEST REPORT

FOR

GLOBE VALVE, 1/2-INCH

Grove Valve and Regulator Company Part Number 11193A046B

NASA Drawing Number 10428576

SUBMITTED BY:

G. Collins,
Test and Evaluation Section

APPROVALS:

R. W. Claunch
Program Supervisor

V. J. Vehko, Director
Engineering Department

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COMPONENT DATA	NASA DWG/SPEC/CODE NO.	FILE NO.
	10428576 & 75M15978	GENERIC CODE
	FIND NO.	COMPLEX 34
	REF DESIG. NO.	SYSTEM
	PRIORITY IV	Pneumatic Supply
NOMENCLATURE	MANUFACTURER	SUBSYSTEM
Globe Valve 1/2 Inch	Grove Valve & Regulator Company	Converter Compressor Facility
		NHA DWG. NO. N/A
CRITICALITY NO.	MFG MODEL NO. A-3	STOCK CODE NO.
CEI NO.	MFG PART NO. 11193A046B	REVISION: Addendum I / DATE 5/3/68
MAINTENANCE MANUAL N/A	MFG DWG NO.	PREPARING ORGANIZATION Chrysler Corporation

SPECIFICATION REQUIREMENTS:

Media: Helium and Nitrogen
Operating Pressure: 6,000 psig
Proof Pressure: 11,000 psig
Burst Pressure: 24,000 psig
Temperature Range: -20°F to +120°F
Orifice Diameter: 0.312 in.
End Connections: Inlet & Outlet AND10050-8

FUNCTION:

The valve was tested to qualify an alternate item for NASA P/N 10428576 and qualify 75M15978 for use in the high pressure gas systems of the Converter Compressor Facility.

ASSESSMENT & RECOMMENDATIONS:

The specimen successfully completed the seat erosion test, but ruptured a packing O-ring at 14,600 psig in the burst test. During the basic test, the valve successfully completed all tests except the burst pressure test. A stem packing ruptured at 15,000 psig in this test.

The subject test report and test report 10877, on the 2 inch size, qualify the entire range of valves on NASA drawing 75M15978 for 6000 psig gas service, where the burst is not considered critical. The burst test failures in both tests were O-rings rupturing rather than catastrophic structural failure.

TEST HISTORY: Sheet 2 of 2

TEST REPORT NO.	TEST TYPE	REMARKS
TR-RE-CCSD-FO 1123-3	Receiving Inspection	Satisfactory
	Proof Pressure	Satisfactory
	Functional	Satisfactory
	Flow	Cv= 3.26
	Surge	Satisfactory
	Low Temperature	Satisfactory
	High Temperature	Satisfactory
	Cycle	Satisfactory
	Burst	Stem seals ruptured at 15,000 psig
TR-RE-CCSD-FO-1123,3, Addendum I	Seat Erosion Burst	Satisfactory Stem seal ruptured at 14,600 psig

SERVICE HISTORY:

None